

Anonymous Referee #2

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i. **The methods including the three steps to selecting SQI should be clearly stated.**

We have stated the three steps in the final paragraph of the introduction and at the start of the methodology. Figure 1 was also designed to clearly illustrate the approach taken:

This study uses a multi-stage approach in the selection and prioritisation of physical SQIs that meet the required criteria and conditions outlined above. It consists of a systematic review and selection procedure, followed by assessment of the selected SQIs and how they could be best applied at a National scale monitoring programme. The final priority list should indicate the soil's capacity to deliver ecosystem goods/services and are therefore indicative of soil quality.

The process of physical SQI selection takes a multi-stage approach as outlined in Figure 1. In the first stage, potential physical SQIs were identified from the available literature, including those defined by Loveland and Thompson (2002) and Merrington et al. (2006). Other physical SQIs (and the methods used to measure them) that had not been considered previously were also included to produce an up-to-date list. In the second stage, the candidate physical SQIs were prioritised using a logical sieve (Ritz *et al.*, 2009) and a scenario-based approach. In this approach, the logical sieve was interrogated by running three scenarios based on typical priorities of different stakeholders by applying weightings to the scores. As such, the approach was used to prioritise a specific soil function or degradation process of interest (Rickson *et al.*, 2012).

Finally, the priority physical SQIs were tested for robustness (statistical reliability and accuracy as well as practicability), spatial and temporal variability and expected rate of change using statistical analysis and modelling. This involves determining appropriate sample numbers for defining meaningful change as well as proxy methods that can be used to make the physical SQI measurements operational and feasible. For example, where a standard measurement physical SQI measurement may be time or resource intensive to measure and monitor in a large scale monitoring programme, an easier/cheaper to measure proxy may exist that could make that physical SQI feasible for inclusion into such a programme.

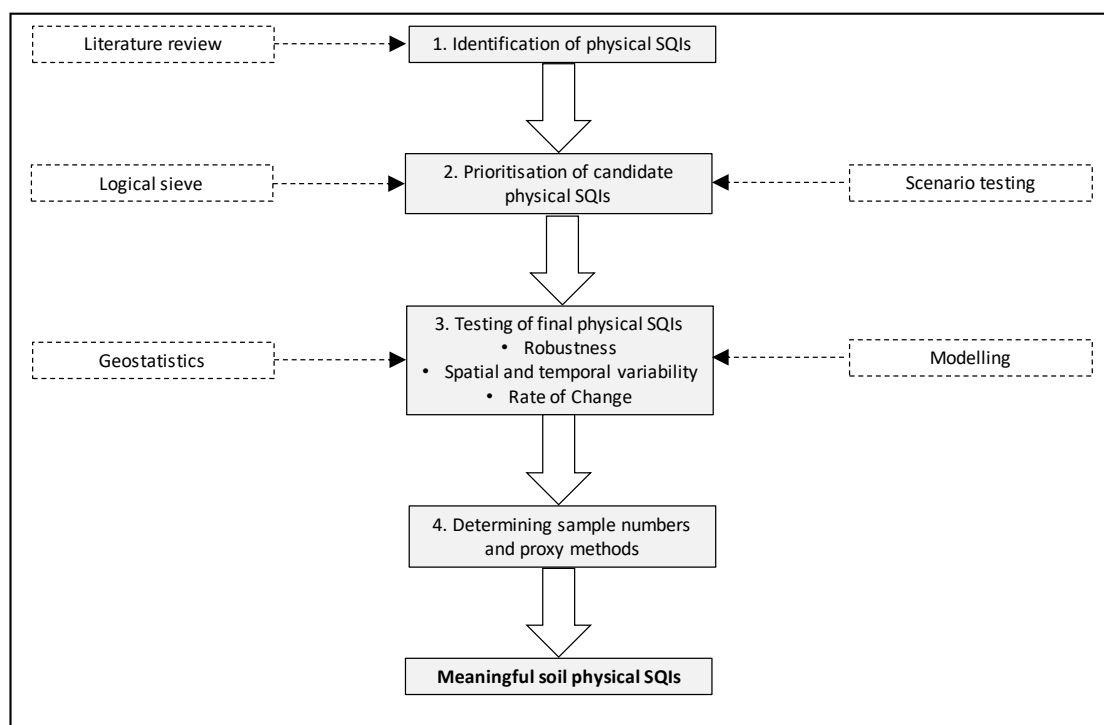


Figure 1: Multi-stage approach taken in the selection of meaningful physical soil quality indicators (SQIs)

- ii. **Why were only three SQIs been discussed? how about others? Was six or seven SQIs were determined at last?**
The process actually identified 7 SQIs that met all of the criteria discussed. These can be referred to in the Rickson et al. (2012) report which is freely available online. However, we only selected three SQIs to include in the manuscript to illustrate the different approaches to the types of analyses that can be conducted depending on the type of soils data available (i.e. quantitative methods such as power analysis or pedo-transfer functions; semi-qualitative such as remote sensing). The selection was also important in order to keep to the word count.

- iii. **Some critical tables should be listed in the manuscript instead of in supplementary categories.**
We have included four supporting figures and four supporting tables in the main text of the manuscript. It was felt that including too many more would detract from the main argument of the text and therefore we have included critical information in the supplementary materials for reference purposes. However, they don't necessarily need to be referred to in order to follow the manuscript.

- iv. **How to use these selected SQIs to quantify British soil quality should be added to the manuscript.**
The text has now been amended in the conclusion section:
By emphasising the current key soil functions related to current soil and environmental policy in the UK (i.e. provisioning and regulating functions), the prioritised SQIs can be related to soil processes, soil functions and consequent delivery of ecosystem goods and services. These are likely to shape any future soil and environmental policy in the UK, as well as efforts to develop soil monitoring programs that aim to evaluate soil physical quality.